

Foreword

Symposium on Standardization of Collection and Preparation of Biomedical Samples for Trace Element Analysis

The past two decades have brought a significant improvement in the trace element analysis of biological samples. The development of new analytical techniques and advances in existing analytical methods were fostered by innovation and rapid development of new and improved instrumentation as well as by energetic research in analytical chemistry. Emphasis on the accuracy of the analytical data was strengthened by the development and issuance of biological reference materials, first by H. J. M. Bowen, and nowadays available from organizations such as the National Research Council of Canada, the Commission of the European Communities, the National Institute for Environmental Sciences of Japan, the International Atomic Energy Agency, the U.S. National Bureau of Standards, and others. The combined effects of this development resulted in more reproducible data on biomedical samples and often much lower detection limits in these materials, but not in an immediately recognizable improvement of accuracy.

However, the better reliability of the analytical procedures has made research possible into the cause of discrepant and biased data in biological trace element analysis. Previous efforts to develop improved data on trace minerals in human and biological media have included several workshops and reviews sponsored by the American Medical Association, the National Institutes of Health, and the International Atomic Energy Agency. We have learned that the wide spread of reported values for both organic and inorganic trace constituents in biological specimens can be attributed largely to the uncritical application of analytical techniques to a particular analytical subsample. Both the origin and the selection of a specific sample from a population and the subsampling from a sample for analysis must be considered as sources of error and, if unknown, may lead to significant bias in data. To preserve a valid subsample that is representative of the original bulk sample for subsequent analysis, a multilevel analytical approach is required. As with the analytical technique, certain strict precautions must be taken during selection, sampling, preparation, transportation, and storage of a biological sample that is to undergo trace analysis. As part of the analytical process, the preanalysis steps need to be critically evaluated; and formalized procedures should be adopted that will aid in assuring the quality of the analytical data. Publications on those activities will become available in the near future. The recommendations emerging from these studies necessarily focus on general issues such as the design of biomedical experiments, characterization and selection of meaningful samples, good laboratory practice, etc., and will not include specific procedures.

To follow up on the aforementioned initiatives and to complement the existing work, the special Sessions on the Standardization of Collection and Preparation of Biomedical Samples for Trace Element Analysis were held at the American Nuclear Society's 1984 Winter Meeting followed by a workshop at the National Bureau of Standards. Although this meeting was initiated by a group of analytical chemists who utilize nuclear techniques, the symposium brought together experts from the different fields of science involved in this type of work, thus creating a forum for input from all necessary experience and technical expertise. The symposium lectures and contributions published in this issue of the Journal of Research therefore are not limited to nuclear analytical techniques but applicable to all methods of trace element analysis of biomedical samples. Plenary lectures dealt with the topics of selection and representative sampling of human specimens, technical considerations and

presampling factors that influence the data, and specimen banking. Experiences with actual protocols and procedures which have been implemented for the accurate trace analysis of various biological media were presented in several lectures.

The formal presentations were followed by a workshop session of which a major part was devoted to a fact-finding discussion. Of main concern at this 1984 meeting was the notable absence of existing validated procedures for the collection and preparation of biomedical samples. It appeared to be of advantage to develop standardized procedures which are applicable to specific situations or which can be adapted to a particular research problem. There was general consensus among the participants that "cookbook" type procedures should be developed. This should be the task of follow-up meetings which again will include the much-needed multidisciplinary approach. The participants expressed their optimism that the contributions made at this meeting and the future work will further enhance our ability to provide more accurate data on the important trace constituents in biological media.

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